

The Fertilisation of Fumariaceæ

IT was with great pleasure and interest that I read the communications from Mr. Darwin and Dr. Hermann Müller in NATURE, vol. ix. p. 460.

It so happens that, since writing the note on the tardy and apparently useless assumption of colour by *Fumaria capreolata* var. *pallidiflora*, I have chanced to see the flowers of this plant visited, on two occasions, by a bee in the daytime.

This insect was, on both occasions, I believe, a mason-bee, and certainly neither a hive nor a humble bee, and, as it confined its attentions to this one variety of fumitory, and was engaged for some time at its work, I had a favourable opportunity of watching the mode of operation.

The bee ranged from plant to plant, but, in every case, would only alight on and suck those flowers which, though still white, had assumed the horizontal position, these flowers alone affording a comfortable landing-stage for the insect.

The bee then clasped the lower part of the tube with its feet, and prized open the flower by thrusting its sheathed proboscis underneath the upper petal, when the tube split lengthwise, and gaped widely open, the style and stamens rising up and emerging from the cap formed by the inner petals, much as they do from the keel in many papilionaceous flowers, and rubbing against the underside of the bee's body.

I may observe that it is precisely in the short period during which the flower maintains itself in the horizontal position that the emission of pollen takes place, and this coincidence of the plant bidding for the visits of insects at that particular moment has much the appearance of special adaptation.

But an examination of the flowers certainly shows that they are capable of self-fertilisation, and Dr. Hermann Müller tells us that Dr. Hildebrand states that this is habitually the case in *F. capreolata*.

I regret that I am only acquainted with Dr. Hildebrand's paper through a review which appeared in the *Bulletin* of the Société Botanique de France, where but few of the details are given.

I have not paid special attention to the structure and habits of the *Fumariaceæ*, and I am therefore unable to say whether the plant to which I have alluded is commonly visited by insects in the daytime, or whether, as Mr. Darwin suggests, its flowers, the nearly white colour of which would render them peculiarly conspicuous in the dusk, may not prove especially attractive to moths and other night-fliers.

While watching the bee whose operations are described above, I noted with interest that it confined its attention exclusively to plants of this single variety of fumitory, winding its way through flowering masses of other fumitories and weeds.

In the same way a honey-bee, at the same spot on a later day, exclusively visited the wild maigrionette (*Reseda phyteuma*), passing by the fumitories, marigolds, &c.

J. TRAHERNE MCCRIDGE

Maison Gastaldy, Mentone, April 20

ALLOW me shortly to resume the different views which have been proposed in your columns, as giving a possible explanation of the fact that the flowers of *F. pallidiflora* attain their brightest colouring when the time for fertilisation has passed, and to point out the observations indispensable to be made, in order to ascertain which of the proposed views is right. 1. It is possible that nocturnal Lepidoptera are the fertilisers of the fumitory; in this case it would be most probable that the pale colour of its flowers has been acquired by natural selection, pale flowers being most conspicuous in the dusk. 2. Diurnal insects may be the fertilisers, and the pale hue may be sufficiently conspicuous or even more attractive for them than the brighter one. In this case, also, the former must be considered as acquired by natural selection; the latter, on the contrary, as in the first case, merely as the result of chemical processes. 3. Under the same supposition of diurnal insects being the fertilisers, it is possible that the older flowers, by their brighter hue, serve to attract insects to the younger and paler ones; in this case the bright hue of the older flowers may be looked upon as acquired under the influence of natural selection, the pale colour of the younger flowers at the same time being useless. 4. It is possible that self-fertilisation is the rule with the flowers of this fumitory, and that cross-fertilisation by insects takes place only very exceptionally; in this case not only, as in No. 3, the paler colour, but also the brighter one would be nearly independent of the influence of natural selection. In order to decide definitely which of these views is right, it is

indispensable to watch perseveringly the flower of this plant, and to ascertain what kind of fertilisation naturally takes place. In case diurnal insects should prove by direct observation to be the fertilisers, it would be possible to decide whether supposition 2 or 3 is correct, by removing from many specimens every older flower as soon as its colour begins to grow brighter, and by observing whether these specimens or those with older and brighter flowers are more frequently visited by insects.

It would be a great pleasure to me to make these observations, but I do not know whence seeds of *Fumaria pallidiflora* can be obtained. Perhaps some reader of this letter may be good enough to give me information on this point.

Lippstadt, April 28

HERMANN MÜLLER

MR. COMBER'S suggestion (vol. ix. p. 484) that the coloured flowers of *Fumaria* attract insects to the uncoloured ones is very ingenious. Supposing that they are cross-fertilised, the case of *Poinsettia* is very pertinent, and is enforced by that of *Dalechampia*, also euphorbiaceous, in which the bracts, a beautiful rose colour before fertilisation, gradually assume afterwards the same green hue as the foliage when the bright colour is no longer needed. The chemical changes that take place in the flower at and after the period of its complete expansion must necessarily be complex, as well as varied in different cases. Rapid oxidation is probably one very effective agent in producing them, but the results will necessarily depend on what is operated upon. *Hibiscus mutabilis* is white in the morning, deep red by night. Species of *Lantana*, like *Myosotis versicolor*, pass through a whole series of colours as they expand. On the other hand all the beautiful species of *Franciscia* rapidly lose the tints with which their flowers open, and become nearly white. The final stages in the life of all the parts of the flower which are not accessory to the formation of the fruit are more or less processes of decay, and there is no absolute law that these should always be accompanied by inconspicuous or displeasing tints. The white flowers of *Calanthe veratrifolia* blacken when they are bruised; on the other hand, according to Kingsley, the crimson flowers of *Couroupita guianensis* turn blue when torn, as the pulp of the fruit is also known to do on exposure to the air. In the same way some fungi exhibit when bruised striking tints which yet can be of no service to them. *Agaricus georginae* changes from snow-white to blood-red wherever it is touched, and the white flesh of *Boletus cyaneus* when broken changes instantly to the "most beautiful azure blue."

In fact if a chemical change is set up—if it produces a change of tint at all—it must sometimes produce a pleasing one; that it should do so is not necessarily advantageous to the plant, though open to be taken advantage of by it.

W. T. THISELTON DYER

Fertilisation of *Corydalis claviculata*

WITH regard to the flowers of *Corydalis claviculata* (of the discovery of which species in this neighbourhood I have sent a note to the *Journal of Botany*), I think Mr. Bennett (vol. ix. p. 484) will find his suspicion that the styles may have been broken off in dissecting to be correct. This may easily be shown by floating off in water the petals, &c., of a withered flower, in which the process of fertilisation has been completed, when the style will be seen adhering to the ovary, though the gentlest touch will be sufficient to separate it. In the bud the anthers cover the stigma, but at the time of maturity the latter projects slightly, so that it would be first touched by the proboscis of an insect. I suspect that it is also slightly protogynous, though self-fertilisation may probably be of frequent occurrence. The manner in which the style is embraced by the stamens and petals protects it from too rough a shock from the struggles of insects in the narrow entrance to the flower. I have not, however, observed them to visit it.

W. E. HART

Kilderry, co. Donegal, April 28

Lakes with two Outfalls

SINCE writing my letter of April 24, with which I forwarded a copy of the new Inch Ordnance map of Arran, I have received other copies from Mr. Stanford, showing, as I presume, that the early copies of General Sir H. James's admirable work have been revised. For, besides the elaborate system of contour lines, which did not appear in the first copies, two outlets are given to Loch-na-Davie, instead of one only. So that, as to the "matter

of fact" touching the new Inch Ordnance map, Mr. Christie and I are both right. That is, he has a copy to show for his assertion; I have one to show for mine. But the great question is not what is the "matter of fact" as touching maps, but what is the matter of fact in nature; and I assert that Loch-na-Davie has but one outlet, to the south, to Glen Iorsa. My words in the *Athenæum* are—"The water-parting is a few yards to the north of the loch, I should guess at the spot where a heap of stones stands, apparently lately thrown up;" and from there there is a slight trickling inlet to the loch. I ended my letter thus—"Most gracious reader of the *Athenæum*, go take a tourist ticket to Glasgow from Euston Square. Then a lovely run in a Clyde steamer to Arran, and judge for yourself." May I repeat this advice to the "gracious reader" of NATURE, for assuredly there is no arguing as to a "matter of fact."

As a matter of opinion, I do not think that any quantity of rain could turn the northern inlet into an outlet. That is, I think that at the southern end there is room to emit any overflow before the northern end could be flooded. Mr. Christie seems to suppose a constant double outlet. Dr. Bryce, more modest, only claims this in "winter and wet summers" (3rd edition, p. 3), or "when it rises about eighteen inches above its level in dry weather" (p. 130).

Alresford, May 1

GEORGE GREENWOOD

I OBSERVE that a correspondence has been going on in the columns of NATURE on the subject of lakes with double outlets. It may interest your readers to learn that some glaciers afford instances of the same phenomenon. One of the most remarkable of these is the Glacier d'Ar sine, in the old French province of Dauphiné (now the Département des Hautes Alpes). This glacier is broad and short; its moraines are extraordinarily large. It ends just on the watershed between the Romanche and Guizanne, and consequently streams flow from it in both directions. On one side, the stream forms a branch of the Romanche, which fall into the Drac, the united stream entering the Isère below Grenoble. On the other side, the stream flows down to the Guizanne, which, after receiving the Clairée near Briançon, assumes the name of the Durance, and falls into the Rhone below Avignon. This watershed is a prolongation of that over which the magnificent route impériale (magnificent in point of engineering and of scenery) of the Col du Lautaret has been carried. This glacier is very rarely visited, though the above-mentioned phenomenon has been remarked before. Perhaps some of your readers can supply the names of other glaciers which present a similar phenomenon. I need only add that these observations were made during personal visits to the Glacier d'Ar sine on July 15 and 17, 1873.

Exeter College, Oxford

W. A. B. COOLIDGE

Trees "Pierced" by other Trees

THE natural phenomenon of one tree within another is very frequently witnessed in India in the case of the "pipal" (vulg. *peepul*) and the palmyra. The first instance which drew my attention to it was one in which a very large specimen of the former with a stem some 4 ft. thick was surmounted by a towering palm which seemed to grow out of, and in continuation of, the solid trunk at a height of about 30 ft., and rose to a height of 30 to 40 ft. more. I speak from recollection only. An amicable dispute took place between two natives, of whom I inquired about it—both strangers to the locality—the one declaring that the palm grew up *inside* the tree from the ground, and the other that it grew *upon* it. Subsequently I saw numbers of others in all stages, and recognised the fact that the fig grows up by the side of the palm and gradually *encloses* it, so completely as to defy examination of the resulting trunk. The tree that I speak of was by far the most remarkable specimen of the kind, and therefore I give its locality. It is a little south of the town of Kodangal, in the Hyderabad country, long. 77° 40' E., lat. 17° 6' N.

May 5

J. HERSCHEL

COLONEL GREENWOOD's solution of the beech-tree pierced by a thorn plant is undoubtedly correct. The New Forest affords many cases of the branches of that tree growing together and forming holes apparently through the trunk. Ivy gives the most striking and familiar examples of its runners crossing and uniting; it is not unusual to find a triangular arrangement of runners which cross each other at intervals of a few inches apart. It may be as well to draw your readers' attention to the spasmodic way in which the leaves of the beech burst in spring: sometimes an entire branch, at others a single twig with less

than twenty leaves, will be in full leaf a week or ten days before the buds have generally burst.

G. H. H.

IN reference to this subject I many years ago met with an instance of a birch growing out of the fork of an oak.

The trunk of the oak at perhaps 8 ft. or 9 ft. from the ground divided into two large arms from between which a birch sprung. The oak was of very considerable age but apparently was not hollow (of this, however, I am not positive). The birch was perhaps 12 ft. or 14 ft. high.

P. P. C.

The Antipathy of Spiders to the Wood of the Spanish Chestnut

CAN any of your readers establish the truth of the following assertion? Spiders' webs are never found upon beams from the Spanish or sweet chestnut tree, even when the timber is several centuries old. The keeper of the ruins of Beaulieu Abbey, in Hampshire, asserts that this is a fact, and the buildings of the Abbey, where beams of Spanish chestnut are used, are free from the invasion of spiders. His attention was drawn to this four years ago, and since then his observations have not thrown any doubt upon its accuracy.

Birkenhead, April 23

G. H. H.

FLOWERS OF THE PRIMROSE DESTROYED BY BIRDS

WE have received several additional letters on this subject, the important statements in which we have brought together here, in continuation of last week's article (vol. ix. p. 509).

Prof. Newton of Cambridge, in reference to Prof. Thistleton Dyer's letter of last week, writes as follows:—

Allow me to remark that the observation of Gilbert White (quoted by Prof. Dyer in NATURE, vol. ix., p. 509) respecting the bird said to "sip the liquor which stands in the nectarium" of the crown-imperial, has not, so far as I know, been confirmed by anyone else. Yielding to no man in my general trust in White's wonderful accuracy, I think that here we ought to suspend our belief, caution being perhaps the more needed, since, as has been pointed out by several of his editors, it is almost certain that the bird he saw was not the bird he supposed it to be.

Major E. R. Festing writes:—

A month ago I saw a caged hen bullfinch that would treat any quantity of primroses which were given to her in precisely the way described by Mr. Darwin in NATURE, vol. ix. p. 482. She gave one snip only to each flower, not again touching the remains of it, which fell to the floor of the cage.

My experience in trying to keep a small garden in London some years ago was, that the yellow crocus flowers were always destroyed by the sparrows as soon as they come into full bloom, no doubt with the same object as the finches have in destroying primroses. I do not remember that the purple or white flowers suffered in the same way.

A correspondent, dating from Exeter College, Oxford, writes as follows:—

Your article on the destruction of primroses brought to my mind several facts which came under my notice lately in a manse-garden in the south of Scotland. Under a cherry-tree the ground was thickly planted with primroses, all the flowers of which were picked by the sparrows. As not only was this cherry-tree in flower at the time, but there was also a good show of flower on the various other fruit-trees in the garden, in this instance, at least, the flowers of the fruit-trees seem not to have exercised a superior attraction.

Again, I myself saw that the work was done by sparrows.

Another writer in your article asks, if any other birds besides sparrows have been seen to use fresh flowers in nest-building? In this same manse-garden, some weeks ago, I watched some jackdaws busily plucking and carrying to their nests in a neighbouring chimney the leaves, flowers, and stalks of a variegated form of the common *Glechoma hederacea*.

Mr. J. Southwell states that in his garden in the suburbs of Norwich, the yellow crocuses are yearly destroyed by sparrows. He says:—

Formerly I have seen these mischievous birds pulling